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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/685,219	10/14/2003	Yaw S. Obeng	SILO-0016	4073
27964	7590	11/16/2006	EXAMINER	
HITT GAINES P.C. P.O. BOX 832570 RICHARDSON, TX 75083			UMEZ ERONINI, LYNETTE T	
			ART UNIT	PAPER NUMBER

1765

DATE MAILED: 11/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/685,219

Applicant(s)

OBENG, YAW S.

Examiner

Lynette T. Umez-Eronini

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5-11 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 October 2003 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This communication is in response to Applicant's Remarks in Amendment, filed 9/1/2006, which was persuasive in showing the motivation for combining the references of Sinha et al. (US 6,551,935 B1), Deckert et al. (US 3,874,129), and Prigge et al. (US 4,968,381) was improper. Hence, a new Office Action is presented.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-3, 5, and 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sinha et al. (US 6,551,935 B1) in view of Deckert et al. (US 3,874,129).

As to claims 1-3, 5 and 8-11, Sinha discloses a slurry for polishing a copper conductive structure of semiconductor device (Abstract). The slurry comprises at least one oxidizer, inhibitor and one or more abrasives (column 3, lines 11-13). Examples of the oxidizer includes hydrogen, ammonium persulfate, potassium iodate (KIO₃), . . . and mixtures thereof (column 5, lines 34-40); corrosion inhibitors include benzotriazole (BTA), potassium silicate, and mixtures thereof and make up 0.05 % to 2 % by weight of the slurry (column 5, lines 52-66); and abrasive agents include alumina and silicon

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dioxide (SiO_2 , same as silica), (column 6, lines 1-3). The slurry can have a pH in the range of 3 to 7 and includes one or more pH control agents or buffers to adjust the pH to a desired level (column 6, lines 6-10). Sinha further teaches a conventional polishing pad or any other pad polishing pad format known in the art that is brought into contact with a copper layer and slurry to remove copper (column 4, lines 27-38). The aforementioned reads on,

A slurry for chemical mechanical polishing (CMP) a metal surface of a semiconductor substrate with a polyurethane free thermoplastic foam polishing body, comprising, an acid buffer that maintains said slurry at a pH between about 2.5 and about 4.0 during polishing of a metal surface on a semiconductor substrate, **in claim 1**; and encompasses,

wherein said pH is between about 2.7 and about 3. 2, **in claim 2**; and

wherein said pH is between about 3.5 and about 4.0, **in claim 3**;

Since Sinha's polishing slurry comprises potassium iodate (same as Applicant's oxidant), then contacting potassium iodate with a metal (Cu) surface that is to be polished, would result the same in the production of a passivation agent, I_2 (column 5, lines 34-40), thereby reading on,

the slurry including an oxidant and a passivation agent, **in claim 8**;

wherein said passivation agent is generated in situ from a reaction between said metal surface and said oxidant, **in claim 9**; and

wherein said oxidant is potassium iodate (KIO_3) said passivation agent is iodine (I_2) and said metal surface includes copper, **in claim 10**.

Since Sinha's polishing slurry comprises an oxidizer such as potassium iodate and further includes an inhibitor (copper corrosion inhibitors) component such as BTA, (same as Applicant's second passivation agent), (column 5, lines 6-23 and 52-67), then using Sinha's slurry in the same manner as claimed by Applicant would result the same wherein a second passivation agent that is not generated in situ wherein said passivation agent and said second passivation agent synergistically interact with said metal surface to retard corrosion of said metal surface, **in claim 11**.

Sinha differs in failing to teach an abrasive particle stabilizer, wherein said abrasive particle stabilizer comprises molecules that are equivalent to repeating units of polymers comprising abrasive particles in said slurry, **in claim 1**; and

wherein said abrasive particles comprise colloidal silica particles and said abrasive particle stabilizer comprises silicic acid and silicic salt, **in claim 5**.

Deckert discloses, polishing agents containing quartz (same as silica or silicon dioxide), silicic acid, silicates and fluosilicates (same as silicic salt), for chemical polishing in order to obtain smooth surfaces for semiconductors (column 1, lines 4-12). Since the combination of Deckert's silicic acid and silicates is the same as Applicant's stabilizer, then using the said combination in the same manner as claimed by Applicant would result the same wherein said abrasive particle stabilizer comprises molecules that are equivalent to repeating units of polymers comprising abrasive particles in the said slurry.

Hence, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Sinha's polishing agent by employing silicic and silicates, (same as Applicant's stabilizer) as taught by Deckert for the purpose of smoothing surfaces of semiconductors that are to be used as components or starting materials for the production of electronic parts, e.g., integrated circuits (Deckert, column 1, lines 9-12).

3. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sinha (US '935 B1) in view of Deckert (US '129) as applied to claim 1 above, and further in view of Prigge et al. (US 4,968,381).

Sinha in view of Deckert differs in failing to teach wherein a ratio of said silicic acid to said silicic salt is between about 100:1 and 1:100, **in claim 6**.

Prigge discloses a polishing solution that contains an additional polishing component containing 1 to 20% by volume of silicic acid or silicates (column 2, lines 5-11) and 1% by volume.

Since Prigge illustrates a polishing slurry that comprises silica or a silicate salt is known, then it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Sinha in view of Deckert by selecting any proportion of (% by volume) of silicic acid or silicates in the Prigge reference, including Applicant's specifically claimed ratio of silicic acid and silicic salt because the said combination has been shown to effectively accomplish the disclosed composition in a method of polishing a composition (see Prigge, column 2, lines 11-14).

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4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sinha in (US '117 B1) in view of Deckert (US '129) as applied to claim 1 above, and further in view of Sato (US 5,906,949).

Sinha in view of Deckert differ in failing to teach wherein said abrasive particle stabilizer comprises aluminate salts.

Sato discloses adding sodium aluminate (same as applicant's aluminate salt) to a slurry containing abrasive particles made of boehmite (same as applicant's alumina).

Since Sato illustrates the combination of abrasive particles comprising alumina and aluminate salt is known, then it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the slurries of Sinha in view of Deckert with a slurry comprising an aluminate salt as taught by Sato for the purpose of improving of the polishing rate without degradation in planarity of the processed surface and in the level of metal impurities (Sato, Abstract).

Response to Arguments

5. Applicant's arguments filed 9/1/2006 have been fully considered but they are not persuasive. Applicant traverses the rejection of claims 1-3, 5 and 8-11 under 35 U.S.C. §103(a) as being unpatentable over to Sinha et al. (US 6,551,935) in view of Deckert (U.S. 3,874,129); and claim 7 over Sinha in view of Deckert, and further in view of Sato (US 5,906,949). Applicant argues the combination of Sinha in view of Deckert fails to teach or suggest all the elements recited in claim 1 and its dependent claims and is not a proper combination. Applicant further argues recited section of Deckert (column 1,

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lines 4-12) does not teach or suggest a slurry that has abrasive particles and an abrasive particle stabilizer, where the abrasive particle stabilizer comprises molecules that are equivalent to repeating units of polymers comprising the abrasive particles. Applicant also argues the Examiner does not cite any portions of Sinha or Deckert that teach or suggest these, or other advantages, associated with having an abrasive particle stabilizer that comprises molecules equivalent to repeating units of polymers comprising abrasive particles. Applicant's argues Deckert fails to explicitly teach or suggest a slurry that has abrasive particles and an abrasive particle stabilizer, where the abrasive particle stabilizer comprises molecules that are equivalent to repeating units of polymer comprising the abrasive particles.

Applicant's arguments are acknowledged but unpersuasive because Deckert teaches a composition that comprises quartz (same as SiO_2 or silica), silicic acid and fluorosilicate (same as silicic salt). Since Deckert's silicic acid and fluorosilicate the using the same in the same manner as taught in the claimed invention would result the same in silicic acid comprising repeating polymers units. Therefore, the combination of Sinha and Deckert would obviously have been provided to one having ordinary skill in the art at the time the invention was made because the said combination of materials are use to effect a method of polishing semiconductor materials.

The Applicant maintain that there is no such recognition by these references, as illustrated by the Examiner's need to cite Sinha for the proposition of teaching abrasive particles, and then to cite a different reference, Deckert, for the proposition of teaching abrasive particle stabilizers. Rather, the Examiner has used hindsight using the

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Applicant's disclosure as a template, to arrive at Deckert, because Deckert presents a list of polishing agents that include quartz, silicic acid, silicates and fluorosilicates.

Applicant's arguments are acknowledged. The Sinha reference is used to disclose a chemical mechanical polishing slurry and a buffer having a pH that lies between 2.5 and 4.0 while the Deckert reference is relied upon to cure Sunhat's deficiencies by teaching an abrasive particle stabilizer, which includes silicic acid and silicic salt.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

6. Applicant's arguments, see Remarks (pages 5-6, filed 9/1/2006, with respect to claim 6 have been fully considered and are persuasive. The rejection of claim 6 has been withdrawn because Applicant's arguments were persuasive in showing the motivation for combining Sinha et al. (US 6,551,935 B1), Deckert et al. (US 3,874,129), and Prigge et al. (US 4,968,381) was improper. Hence, a new motivation is provided.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 571-272-1470. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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ltue

November 7, 2006

NADINE NORTON
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